



QUARTERLY GROUNDWATER MONITORING REPORT

Second Quarter 2004 (Eighth Quarterly)

Sampled on May 4, 2004

Job # SP-120

LOP # 12365

January 5, 2005

Bigfoot Gas (Big Oil & Tire - Bigfoot Service Station)
2801 Central Avenue
McKinleyville, California 95519

This *Quarterly Groundwater Monitoring Report* was prepared by SounPacific Environmental Services (SounPacific) staff for Big Oil & Tire Co. (BO&T), using previous studies that were conducted by Clearwater Group, Inc. (CGI) and file review conducted at Humboldt County Department of Health and Human Services: Division of Environmental Health (HCDEH). The station is located at 2801 Central Avenue in McKinleyville, California (Figure 1).

SITE DESCRIPTION

The site is surfaced around the current structure with concrete and asphalt. Site improvements include a single story building with an attached, overhead awning that covers the main dispenser islands. The main structure covers approximately 800 square feet and is positioned near the center of the property with the entrance to the building facing west towards Central Avenue. Attached to the main structure is a small out building at the north end of the property that is used for storage (Figure 2).

Two (2) 12,000-gallon split compartmented underground storage tanks (USTs) are located in a

single excavation between the station and Central Avenue and are used for the storage of three (3) grades of unleaded gasoline and diesel fuel. Fuel is dispensed from two (2) main dispenser islands, which are located under the awning. BO&T owns, operates and is therefore responsible for the maintenance and testing of the product lines and the UST system on a regular basis. The site is serviced by public utilities. Surface water is controlled by drainage ditches and storm drains (Figure 2).

SITE TOPOGRAPHY AND LAND USE

SounPacific understands that the property is currently owned by BO&T of Arcata, California. The main structure is used as a retail gas station for the dispensing of three (3) grades of unleaded gasoline and diesel fuel from the USTs on site. On the north section of the property, a commercial propane tank is stored and used for the filling of smaller propane tanks for the public (Figure 2). The surrounding land use is a mixture of commercial and residential. An automobile garage is located immediately to the south across Murray Road, and properties adjacent to the east, west and north are undeveloped.

The site is approximately two (2) miles east of the Pacific Ocean and approximately 110 feet above mean sea level (MSL). The site is situated approximately 600 feet South of Norton Creek and 1,400 feet North of Widow White Creek. According to the United States Geological Survey Arcata North Quadrangle California-Humboldt County, 7.5 minute series (Topographic) 1959 (photo-revised 1972), a tributary of Norton Creek is re-routed into an underground culvert along the South side of the site. Norton Creek is also artificially controlled along the eastern side of Central Avenue near the site. These two engineered drainage features intersect near the southwestern corner of the property and flow west, toward the Pacific Ocean (Figure 2). It is uncertain if the engineered drainage along the southern and western boundaries of the site will exhibit any hydraulic influence on groundwater flow directly beneath the site. Topography consists of rolling terrain that gently slopes west toward the Pacific Ocean (Figure 1).

RESULTS OF QUARTERLY SAMPLING

A quarterly groundwater monitoring program was implemented on July 15, 2002, and will continue until further notice. This program consists of conducting quarterly groundwater sampling to monitor hydrocarbon concentrations on site, and collecting quarterly water level data to document any changes in groundwater levels and track any noticeable changes in groundwater gradient and direction of flow. Monitoring wells were gauged and sampled on May 4, 2004.

FIELD DATA

Wells gauged: MW-1, 2, 3, 4, 5, and 6
Groundwater: Ranged from 109.52 to 110.44 feet above mean sea level (Table 1)
Floating product: None detected
GW Flow Direction: West (Figure 3)
Groundwater gradient: 0.008 ft/ft

Groundwater levels for the May 4, 2004 monitoring event, along with historical level and elevations are included in Table 1. Groundwater flow was towards the west at a gradient of 0.008 feet per foot. The groundwater flow and gradient are graphically depicted in Figure 3.

ANALYTICAL RESULTS

Sampling locations: MW-1, 2, 3, 4, 5, and 6
Analyses performed: TPHg, BTXE, MTBE, DIPE, TAME, ETBE, TBA, EDC, EDB, TPHd, TPHmo
Laboratories Used: Excelchem Environmental Labs, Arcata, California

The analytical results for the current monitoring event are presented below and graphically depicted in Figure 4. The laboratory report is included in Appendix A. The historical analytical results for all monitoring wells, since the implementation of groundwater monitoring are included as Table 2.

	<u>MW-1 (ppb)</u>	<u>MW-2 (ppb)</u>	<u>MW-3 (ppb)</u>	<u>MW-4 (ppb)</u>	<u>MW-5 (ppb)</u>	<u>MW-6 (ppb)</u>
TPHg:	ND < 50	1,300	82	8,000	54,000	2,200
Benzene:	ND < 0.5	ND < 5.0	ND < 0.5	130	ND < 50	25
Toluene:	ND < 0.5	ND < 5.0	ND < 0.5	140	720	2.4
Xylenes:	ND < 1.0	ND < 10.0	0.5	504	12,800	200.5
Ethylbenzene:	ND < 0.5	ND < 5.0	ND < 0.5	420	1,300	4.0
MTBE:	0.5	1,200	57	19	ND < 50	69
DIPE:	ND < 0.5	ND < 50	ND < 0.5	ND < 5.0	ND < 50	ND < 0.5
TAME:	ND < 0.5	530	32	ND < 5.0	ND < 50	17
ETBE:	ND < 0.5	ND < 50	ND < 0.5	ND < 5.0	ND < 50	ND < 0.5
TBA:	ND < 5.0	ND < 500	ND < 5.0	ND < 50	ND < 500	27
EDC:	ND < 0.5	ND < 50	ND < 0.5	ND < 5.0	ND < 50	ND < 0.5
EDB:	ND < 0.5	ND < 50	ND < 0.5	ND < 5.0	ND < 50	ND < 0.5
TPHd:	ND < 50	190	55	1,300	19,000	590
TPHmo:	ND < 500	ND < 500	ND < 500	ND < 500	ND < 500	ND < 500

ND = non-detectable

COMMENTS AND RECOMMENDATIONS

On May 4, 2004, the 8th groundwater monitoring event, following the initial sampling, for the six on-site monitoring wells was conducted at the Bigfoot Gas Station at 2801 Central Avenue in McKinleyville, CA. A summary of the results are presented below.

- The depth to groundwater in the six wells ranged between 2.03 feet bgs and 3.24 feet bgs. When corrected to mean sea-level, the elevations ranged between 109.52 feet above mean sea-level (amsl) in MW-3 to 110.44 feet amsl in MW-5. Groundwater flow was towards the West at a gradient of 0.008 feet per foot.
- Groundwater samples from the six on-site wells were collected and analyzed for TPHg,

BTXE, five (5) fuel oxygenates, lead scavengers, TPHd, and TPHmo. Laboratory results reported TPHg in all wells except MW-1 at concentrations ranging from 82 ppb (MW-3) to 54,000 ppb (MW-5). Benzene was reported in wells MW-4 and MW-6 at concentrations of 130 ppb and 25 ppb, respectively. Toluene was reported in wells MW-4, MW-5, and MW-6 at concentrations ranging from 2.4 ppb (MW-6) to 720 ppb (MW-5). Xylenes were reported in wells MW-3, MW-4, MW-5, and MW-6 at concentrations ranging from 0.5 ppb (MW-3) to 12,800 ppb (MW-5). Ethylbenzene was reported in wells MW-4, MW-5, and MW-6 at concentrations ranging from 4.0 ppb (MW-6) to 1,300 ppb (MW-5). Of the fuel oxygenates, MTBE was reported in all wells except MW-5 at concentrations ranging from 0.5 ppb (MW-1) to 1,200 ppb (MW-2), TAME was reported in wells MW-2, MW-3, and MW-6 at concentrations ranging from 17 ppb (MW-6) to 530 ppb (MW-2), and tertiary butanol was reported in well MW-6 at a concentration of 27 ppb. No other fuel oxygenates were reported, however, the absence of fuel oxygenates in MW-5, may be a result of the elevated reporting limits. Lead scavengers were reported at a level of 0.8 ppb only in well MW-3. TPHd was reported in all wells except MW-1 at concentrations ranging from 55 ppb (MW-3) and 19,000 ppb (MW-5). No TPHmo was reported in any of the wells.

Based upon these results the following observations and conclusions have been made.

- Laboratory results have detected fluctuating levels of TPHg in all wells except MW-1 during the monitoring program thus far, see Figures 5 through 10. TPHg was last detected in MW-1 during the 2nd Quarterly sampling event in November 2002.
- BTXE has not been reported in MW-1 since the Well Installation sampling event. BTXE was reported in wells MW-2 and MW-3 during varying sampling events. BTXE was reported in wells MW-4 and MW-5 during all sampling events thus far. BTXE concentrations in wells MW-2 through MW-5 have fluctuated with no apparent decrease. BTXE concentrations have been reported in well MW-6 and appear to be decreasing overall. See Figures 5 through 10.
- MTBE has been reported in wells MW-2 and MW-3 during every sampling event since the installation of the wells. Concentrations fluctuate in the range of 10³ ppb in MW-2 and

from 10^2 to 10^3 ppb in MW-3. MTBE has been reported consistently with varying concentrations in wells MW-1, MW-4, and MW-6, with an overall decreasing trend in concentration in well MW-6. MTBE has not been reported in MW-5 since the 2nd Quarterly sampling event. See Figures 5 through 10.

- DIPE has not been reported in any wells since the inception of the monitoring program.
- TAME was reported in wells MW-2 and MW-3, and has been consistently reported in these wells since the inception of the monitoring. Concentrations of TAME in these wells have been fluctuating. TAME has been detected in MW-6 during multiple sampling events, with an overall decrease in concentrations. TAME has been reported in MW-1 during multiple sampling events at consistently low concentrations. TAME was reported one time in both MW-4 and MW-5, however not for several sampling events.
- ETBE has only been reported one time in well MW-2 during the 3rd Quarterly sampling event.
- TBA was reported once in the last quarter in MW-6, where it has been detected twice since the inception of monitoring. TBA has not been reported in MW-1, MW-4, or MW-5 thus far, and has appeared in wells MW-2 and MW-3 only during one and two sampling events, respectively.
- TPHd has been reported frequently in wells MW-4, MW-5, and MW-6, with concentrations varying from 10^2 to 10^3 ppb. TPHd was reported in MW-2 and MW-3 during the last quarter, but has not appeared there consistently. TPHd has not been reported in MW-1 since the inception of monitoring.
- TPHmo has been reported once in MW-5 and MW-6 in the Well Installation and 3rd Quarterly sampling events, respectively. TPHmo has not been detected at any other time since the inception of monitoring.
- Lead scavengers as EDC have been reported at low concentrations (< 2 ppb) during multiple events in MW-3, including the 8th Quarter. EDC was also reported in MW-6 during the 4th Quarter. EDC and EDB were not reported in any other well since the inception of monitoring.

Based on the results of the May 2004 monitoring event and historical results, the following future activities are proposed.

- Groundwater monitoring will be continued until further notice. Groundwater level measurements will be collected from the six on-site monitoring wells to determine groundwater flow direction and gradient. Collected groundwater samples will be analyzed for TPHg, BTXE, five fuel oxygenates, TPHd, TPHmo, and lead scavengers (EDB and EDC).
- SounPacific is currently in the final stage of review for the workplan to delineate the source(s) of soil contamination at the site, as requested in the July 14, 2003, correspondence from HCDEH.

CERTIFICATION

This report was prepared under the direct supervision of a California registered geologist at SounPacific. All information provided in this report including statements, conclusions and recommendations are based solely upon field observations and analyses performed by a state-certified laboratory. SounPacific is not responsible for laboratory errors.

SounPacific promises to perform all its work in a manner that is currently used by members in similar professions working in the same geographic area. SounPacific will do whatever is reasonable to ensure that data collection is accurate. Please note however, that rain, buried utilities, and other factors can influence groundwater depths, directions and other factors beyond what SounPacific could reasonably determine.

SounPacific

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ATTACHMENTS

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Table 1
Water Levels

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Sample Location	Date	Depth to Bottom/ Feet BGS	Survey Height/ Feet Above MSL	Depth to Water/ Feet BGS	Adjusted Elevation/ Feet Above MSL
MW-1	5/1/2002	11.66	111.57	1.54	110.03
	5/30/2002	11.67	111.57	2.43	109.14
	7/3/2002	11.63	111.57	2.65	108.92
	8/3/2002	11.62	111.57	3.40	108.17
	9/4/2002	11.64	111.57	3.90	107.67
	10/4/2002	11.70	111.57	4.25	107.32
	11/4/2002	11.65	111.57	4.36	107.21
	12/2/2002	12.63	111.57	3.61	107.96
	1/6/2003	11.66	111.57	1.22	110.35
	2/5/2003	11.67	111.57	1.31	110.26
	3/7/2003	11.67	111.57	1.67	109.90
	4/8/2003	11.67	111.57	1.00	110.57
	5/12/2003	11.67	111.57	1.32	110.25
	8/2/2003	11.88	111.57	3.11	108.46
	11/8/2003	11.88	111.57	2.57	109.00
	2/5/2004	11.88	111.57	1.21	110.36
	5/4/2004	11.88	111.57	2.03	109.54
MW-2	5/1/2002	12.00	113.03	2.75	110.28
	5/30/2002	11.85	113.03	3.63	109.40
	7/3/2002	11.87	113.03	4.20	108.83
	8/3/2002	11.87	113.03	4.68	108.35
	9/4/2002	11.87	113.03	5.22	107.81
	10/4/2002	9.71	113.03	5.64	107.39
	11/4/2002	11.82	113.03	5.67	107.36
	12/2/2002	11.83	113.03	4.83	108.20
	1/6/2003	11.86	113.03	2.46	110.57
	2/5/2003	10.22	113.03	2.52	110.51
	3/7/2003	11.72	113.03	2.71	110.32
	4/8/2003	11.72	113.03	2.22	110.81
	5/12/2003	11.72	113.03	2.53	110.50
	8/2/2003	11.98	113.03	4.31	108.72
	11/8/2003	11.98	113.03	3.95	109.08
	2/5/2004	11.98	113.03	2.44	110.59
	5/4/2004	11.98	113.03	3.24	109.79

Table 1 (cont.)
Water Levels
 Bigfoot Gas
 2801 Central Avenue
 McKinleyville, Californian 95519

Sample Location	Date	Depth to Bottom/ Feet BGS	Survey Height/ Feet Above MSL	Depth to Water/ Feet BGS	Adjusted Elevation/ Feet Above MSL
MW-3	5/1/2002	11.39	112.13	2.15	109.98
	5/30/2002	11.24	112.13	2.94	109.19
	7/3/2002	11.25	112.13	3.41	108.72
	8/3/2002	11.24	112.13	3.84	108.29
	9/4/2002	11.21	112.13	4.32	107.81
	10/4/2002	11.22	112.13	4.69	107.44
	11/4/2002	11.22	112.13	4.83	107.30
	12/2/2002	11.23	112.13	4.02	108.11
	1/6/2003	11.25	112.13	1.91	110.22
	2/5/2003	11.25	112.13	2.00	110.13
	3/7/2003	11.29	112.13	2.30	109.83
	4/8/2003	11.29	112.13	1.69	110.44
	5/12/2003	11.29	112.13	1.99	110.14
	8/2/2003	11.46	112.13	3.57	108.56
	11/8/2003	11.46	112.13	3.00	109.13
	2/5/2004	11.46	112.13	1.91	110.22
	5/4/2004	11.46	112.13	2.61	109.52
MW-4	5/1/2002	11.34	112.76	2.44	110.32
	5/30/2002	11.14	112.76	3.28	109.48
	7/3/2002	11.11	112.76	3.84	108.92
	8/3/2002	11.14	112.76	4.32	108.44
	9/4/2002	11.12	112.76	4.86	107.90
	10/4/2002	11.12	112.76	5.24	107.52
	11/4/2002	11.05	112.76	5.36	107.40
	12/2/2002	11.08	112.76	4.51	108.25
	1/6/2003	11.05	112.76	2.04	110.72
	2/5/2003	11.06	112.76	2.17	110.59
	3/7/2003	11.24	112.76	2.51	110.25
	4/8/2003	11.24	112.76	1.69	111.07
	5/12/2003	11.24	112.76	3.14	109.62
	8/2/2003	11.32	112.76	4.03	108.73
	11/8/2003	11.32	112.76	3.31	109.45
	2/5/2004	11.32	112.76	2.03	110.73
	5/4/2004	11.32	112.76	2.85	109.91

Table 1 (cont.)**Water Levels**

Bigfoot Gas
 2801 Central Avenue
 McKinleyville, California 95519

Sample Location	Date	Depth to Bottom/ Feet BGS	Survey Height/ Feet Above MSL	Depth to Water/ Feet BGS	Adjusted Elevation/ Feet Above MSL
MW-5	5/1/2002	11.10	112.62	1.43	111.19
	5/30/2002	11.11	112.62	2.71	109.91
	7/3/2002	11.12	112.62	3.31	109.31
	8/3/2002	11.14	112.62	3.85	108.77
	9/4/2002	11.12	112.62	4.37	108.25
	10/4/2002	11.15	112.62	4.85	107.77
	11/4/2002	11.15	112.62	4.97	107.65
	12/2/2002	11.13	112.62	4.02	108.60
	1/6/2003	11.15	112.62	1.11	111.51
	2/5/2003	11.18	112.62	1.23	111.39
	3/7/2003	11.15	112.62	1.70	110.92
	4/8/2003	11.15	112.62	0.95	111.67
	5/12/2003	11.15	112.62	1.33	111.29
	8/2/2003	11.36	112.62	3.53	109.09
	11/8/2003	11.36	112.62	2.67	109.95
	2/5/2004	11.36	112.62	1.10	111.52
	5/4/2004	11.36	112.62	2.18	110.44
MW-6	5/1/2002	10.92	112.38	2.31	110.07
	5/30/2002	10.91	112.38	3.13	109.25
	7/3/2002	10.91	112.38	3.64	108.74
	8/3/2002	10.92	112.38	4.09	108.29
	9/4/2002	10.93	112.38	4.61	107.77
	10/4/2002	10.96	112.38	4.99	107.39
	11/4/2002	10.92	112.38	5.05	107.33
	12/2/2002	10.93	112.38	4.27	108.11
	1/6/2003	10.93	112.38	2.05	110.33
	2/5/2003	10.95	112.38	2.14	110.24
	3/7/2003	10.95	112.38	2.46	109.92
	4/8/2003	10.95	112.38	1.82	110.56
	5/12/2003	10.95	112.38	3.12	109.26
	8/2/2003	11.13	112.38	3.81	108.57
	11/8/2003	11.13	112.38	3.03	109.35
	2/5/2004	11.13	112.38	2.07	110.31
	5/4/2004	11.13	112.38	2.75	109.63

Notes:

Bgs: Below Ground Surface

MSL: Mean Sea Level

Table 2
Groundwater Analytical Results from Monitoring Wells
 Bigfoot Gas
 2801 Central Avenue
 McKinleyville, California 95519

Sample Location	Sample Event	Annual Quarter	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Xylenes (ppb)	Ethylbenzene (ppb)	MTBE (ppb)	DIPE (ppb)	TAME (ppb)	ETBE (ppb)	TBA (ppb)	TPHd (ppb)	TPHmo (ppb)	EDC (ppb)	EDB (ppb)
MW-1	Well Installation	2nd Quarter	5/1/2002	ND < 50	ND < 0.3	0.3	ND < 0.6	ND < 0.3	10.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 100	ND < 50	ND < 50	NT	NT
	1st Quarterly	3rd Quarter	8/3/2002	91	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	114	ND < 0.5	7.5	ND < 0.5	ND < 100	ND < 50	ND < 50	NT	NT
	2nd Quarterly	4th Quarter	11/4/2002	90.4	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	94.7	ND < 0.5	7.6	ND < 0.5	ND < 50	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	2/5/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	4th Quarterly	2nd Quarter	5/12/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	5th Quarterly	3rd Quarter	8/2/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	23	ND < 0.5	1.0	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	6th Quarterly	4th Quarter	11/8/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	88	ND < 0.5	3.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	7th Quarterly	1st Quarter	2/5/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
MW-2	8th Quarterly	2nd Quarter	5/4/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	Well Installation	2nd Quarter	5/1/2002	498	ND < 0.3	ND < 0.3	3.9	1.3	1,380	ND < 0.5	552	ND < 0.5	ND < 100	ND < 50	ND < 50	NT	NT
	1st Quarterly	3rd Quarter	8/3/2002	8,870	15.7	0.5	3.9	2.2	8,160	ND < 0.5	3,460	ND < 0.5	ND < 100	ND < 50	ND < 50	NT	NT
	2nd Quarterly	4th Quarter	11/4/2002	674	28.3	ND < 0.3	ND < 0.6	ND < 0.3	1,130	ND < 0.5	526	ND < 0.5	ND < 50	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	2/5/2003	1,200	0.5	ND < 0.5	ND < 1	ND < 0.5	1,900	ND < 0.5	800	4.9	690	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	4th Quarterly	2nd Quarter	5/12/2003	540	ND < 50	ND < 50	ND < 100	ND < 50	730	ND < 50	140	ND < 50	ND < 500	ND < 50	ND < 500	ND < 50	ND < 50
	5th Quarterly	3rd Quarter	8/2/2003	ND < 5,000	ND < 50	ND < 50	ND < 100	ND < 50	1,200	ND < 50	430	ND < 50	ND < 500	140	ND < 500	ND < 50	ND < 50
	6th Quarterly	4th Quarter	11/8/2003	790	ND < 50	ND < 50	ND < 100	ND < 50	4,200	ND < 50	1,800	ND < 50	ND < 500	150	ND < 500	ND < 50	ND < 50
	7th Quarterly	1st Quarter	2/5/2004	440	ND < 50	85	120	ND < 50	1,700	ND < 50	860	ND < 50	ND < 500	93	ND < 500	ND < 50	ND < 50
MW-3	8th Quarterly	2nd Quarter	5/4/2004	1,300	ND < 5.0	ND < 5.0	ND < 10.0	ND < 5.0	1,200	ND < 50	530	ND < 50	ND < 500	190	ND < 500	ND < 50	ND < 50
	Well Installation	2nd Quarter	5/1/2002	102	2.9	ND < 0.3	5.0	0.8	153	ND < 0.5	46.3	ND < 0.5	ND < 100	ND < 50	ND < 50	NT	NT
	1st Quarterly	3rd Quarter	8/3/2002	8,260	383	145	1,970	420	4,000	ND < 0.5	1,580	ND < 0.5	ND < 100	916	ND < 50	NT	NT
	2nd Quarterly	4th Quarter	11/4/2002	537	30.8	0.7	39.5	24.9	928	ND < 0.5	358	ND < 0.5	ND < 50	ND < 50	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	2/5/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1	ND < 0.5	100	ND < 0.5	27	ND < 0.5	17	ND < 50	ND < 500	1.6	ND < 0.5
	4th Quarterly	2nd Quarter	5/12/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1	ND < 0.5	28	ND < 0.5	5.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	1.2	ND < 0.5
	5th Quarterly	3rd Quarter	8/2/2003	6,400	75	ND < 5.0	1,000	460	1,200	ND < 5.0	540	ND < 5.0	530	ND < 50	ND < 500	ND < 5.0	ND < 5.0
	6th Quarterly	4th Quarter	11/8/2003	52	ND < 0.5	ND < 0.5	1.2	0.5	120	ND < 0.5	68	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	7th Quarterly	1st Quarter	2/5/2004	ND < 50	ND < 0.5	ND < 0.5	ND < 1	ND < 0.5	40	ND < 0.5	9.4	ND < 0.5	ND < 5.0	ND < 50	ND < 500	0.9	ND < 0.5
MW-3	8th Quarterly	2nd Quarter	5/4/2004	82	ND < 0.5	ND < 0.5	0.5	ND < 0.5	57	ND < 0.5	32	ND < 0.5	ND < 5.0	55	ND < 500	0.8	ND < 0.5

TPHg: Total petroleum hydrocarbons as gasoline
 MTBE: Methyl tertiary butyl ether
 DIPE: Diisopropyl ether
 TAME: Tertiary amyl methyl ether
 TPHd: Total petroleum hydrocarbons as diesel
 NT: Not tested.

TBA: Tertiary butanol
 ETBE: Ethyl tertiary butyl ether
 TPHmo: Total petroleum hydrocarbons as motor oil
 ppb: parts per billion = µg/l = .001 mg/l = 0.001 ppm.
 ND: Not detected. Sample was detected at or below the method detection limit as shown.

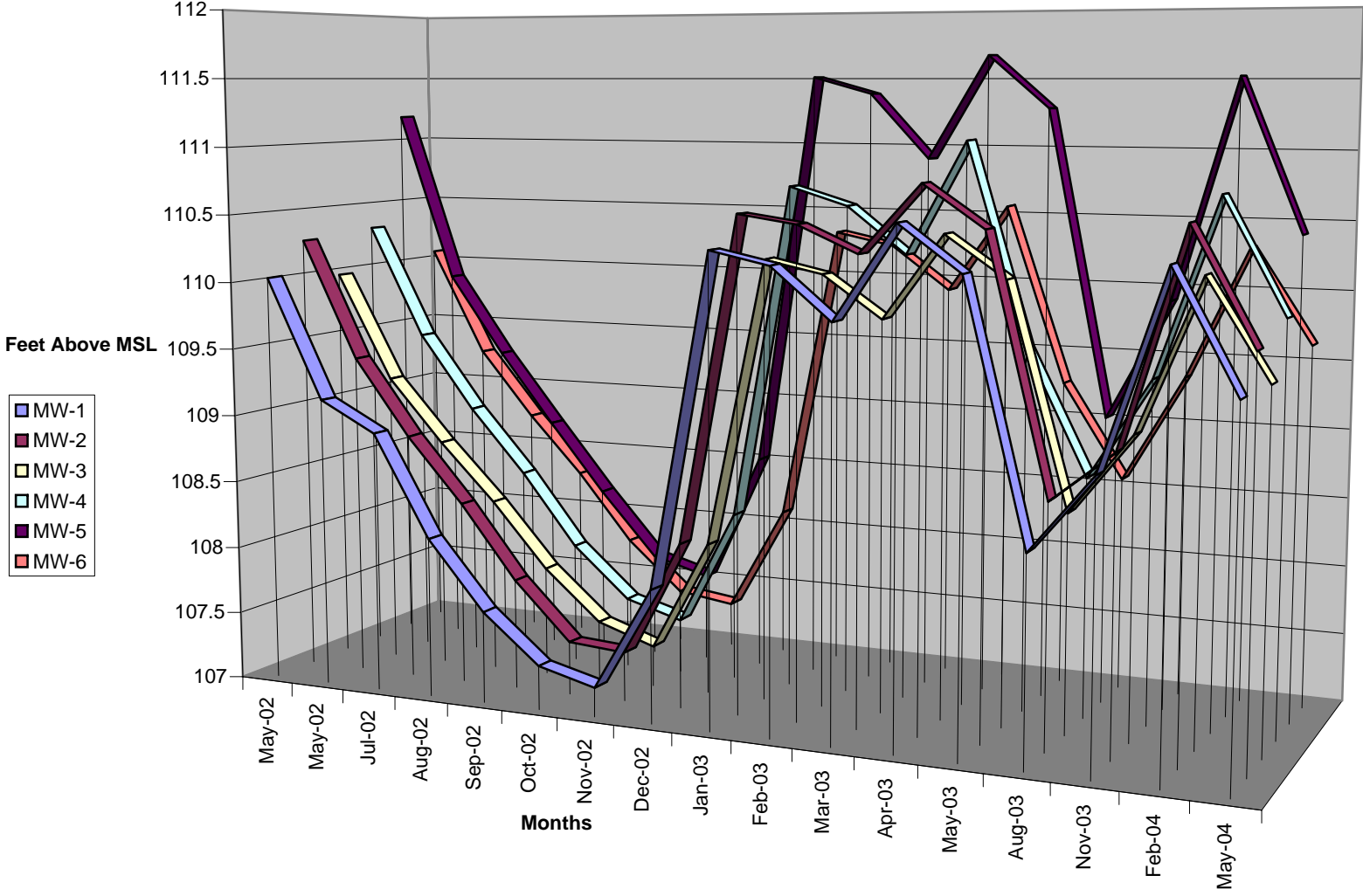
Table 2 (cont.)
Groundwater Analytical Results from Monitoring Wells
 Bigfoot Gas
 2801 Central Avenue
 McKinleyville, California 95519

Sample Location	Sample Event	Annual Quarter	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Xylenes (ppb)	Ethylbenzene (ppb)	MTBE (ppb)	DIPE (ppb)	TAME (ppb)	ETBE (ppb)	TBA (ppb)	TPHd (ppb)	TPHmo (ppb)	EDC (ppb)	EDB (ppb)
MW-4	Well Installation	2nd Quarter	5/1/2002	7,970	157	356	1,270	483	ND < 20	ND < 5	ND < 5	ND < 5	ND < 1,000	489	ND < 50	NT	NT
	1st Quarterly	3rd Quarter	8/3/2002	9,150	193	720	2,430	1,080	53	ND < 15	ND < 15	ND < 15	ND < 5,000	2,770	ND < 50	NT	NT
	2nd Quarterly	4th Quarter	11/4/2002	6,090	207	343	712	530	ND < 2.0	ND < 0.5	ND < 0.5	ND < 0.5	ND < 50	159	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	2/5/2003	20,000	170	120	890	600	ND < 5.0	ND < 5.0	ND < 5.0	ND < 5.0	ND < 50	2,000	ND < 500	ND < 5.0	ND < 5.0
	4th Quarterly	2nd Quarter	5/12/2003	6,200	96	77	248	220	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	680	ND < 500	ND < 50	ND < 50
	5th Quarterly	3rd Quarter	8/2/2003	7,700	130	59	406	470	31	ND < 5.0	20	ND < 5.0	ND < 50	ND < 50	ND < 500	ND < 5.0	ND < 5.0
	6th Quarterly	4th Quarter	11/8/2003	7,900	260	190	385	480	56	ND < 5.0	ND < 5.0	ND < 5.0	ND < 50	500	ND < 500	ND < 5.0	ND < 5.0
	7th Quarterly	1st Quarter	2/5/2004	7,600	180	110	334	460	29	ND < 5.0	ND < 5.0	ND < 5.0	ND < 50	ND < 50	ND < 500	ND < 5.0	ND < 5.0
	8th Quarterly	2nd Quarter	5/4/2004	8,000	130	140	504	420	19	ND < 5.0	ND < 5.0	ND < 5.0	ND < 50	1,300	ND < 500	ND < 5.0	ND < 5.0
MW-5	Well Installation	2nd Quarter	5/1/2002	63,800	ND < 150	1,270	19,500	1,720	ND < 1,000	ND < 250	ND < 250	ND < 250	ND < 50,000	4,420	396	NT	NT
	1st Quarterly	3rd Quarter	8/3/2002	30,500	ND < 15	486	17,700	1,760	ND < 25	ND < 15	ND < 15	ND < 15	ND < 5,000	9,630	ND < 50	NT	NT
	2nd Quarterly	4th Quarter	11/4/2002	81,000	789	ND < 300	24,600	3,710	2,330	ND < 500	1,570	ND < 500	ND < 100,000	3,870	ND < 50	ND < 500	ND < 500
	3rd Quarterly	1st Quarter	2/5/2003	78,000	51	1,600	16,800	1,600	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	ND < 50	ND < 500	ND < 50	ND < 50
	4th Quarterly	2nd Quarter	5/12/2003	43,000	ND < 50	790	13,400	1,200	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	4,100	ND < 500	ND < 50	ND < 50
	5th Quarterly	3rd Quarter	8/2/2003	17,000	ND < 50	120	3,890	400	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	ND < 50	ND < 500	ND < 50	ND < 50
	6th Quarterly	4th Quarter	11/8/2003	43,000	ND < 50	760	16,100	1,500	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	4,100	ND < 500	ND < 50	ND < 50
	7th Quarterly	1st Quarter	2/5/2004	39,000	50	1,400	22,500	2,000	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	ND < 50	ND < 500	ND < 50	ND < 50
	8th Quarterly	2nd Quarter	5/4/2004	54,000	ND < 50	720	12,800	1,300	ND < 50	ND < 50	ND < 50	ND < 50	ND < 500	19,000	ND < 500	ND < 50	ND < 50
MW-6	Well Installation	2nd Quarter	5/1/2002	3,750	845	576	1,070	155	980	ND < 0.5	791	ND < 0.5	ND < 100	ND < 50	ND < 50	NT	NT
	1st Quarterly	3rd Quarter	8/3/2002	11,800	508	62	8,630	1,640	750	ND < 15	300	ND < 15	ND < 5,000	1,900	ND < 50	NT	NT
	2nd Quarterly	4th Quarter	11/4/2002	9,480	535	35.2	3,420	743	1,330	ND < 0.5	558	ND < 0.5	ND < 50	190	ND < 50	ND < 0.5	ND < 0.5
	3rd Quarterly	1st Quarter	2/5/2003	4,500	20	ND < 5.0	583	190	ND < 5.0	ND < 5.0	17	ND < 5.0	ND < 50	1,200	ND < 500	ND < 5.0	ND < 5.0
	4th Quarterly	2nd Quarter	5/12/2003	2,200	22	1.2	244	160	68	ND < 0.5	14	ND < 0.5	60	280	ND < 500	0.9	ND < 0.5
	5th Quarterly	3rd Quarter	8/2/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	1	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	2,500	ND < 0.5	ND < 0.5
	6th Quarterly	4th Quarter	11/8/2003	ND < 50	ND < 0.5	ND < 0.5	ND < 1.0	ND < 0.5	1.3	ND < 0.5	ND < 0.5	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	7th Quarterly	1st Quarter	2/5/2004	110	4.2	ND < 0.5	ND < 1.0	ND < 0.5	16	ND < 0.5	5.6	ND < 0.5	ND < 5.0	ND < 50	ND < 500	ND < 0.5	ND < 0.5
	8th Quarterly	2nd Quarter	5/4/2004	2,200	25	2.4	200.5	4.0	69	ND < 0.5	17	ND < 0.5	27	590	ND < 500	ND < 0.5	ND < 0.5

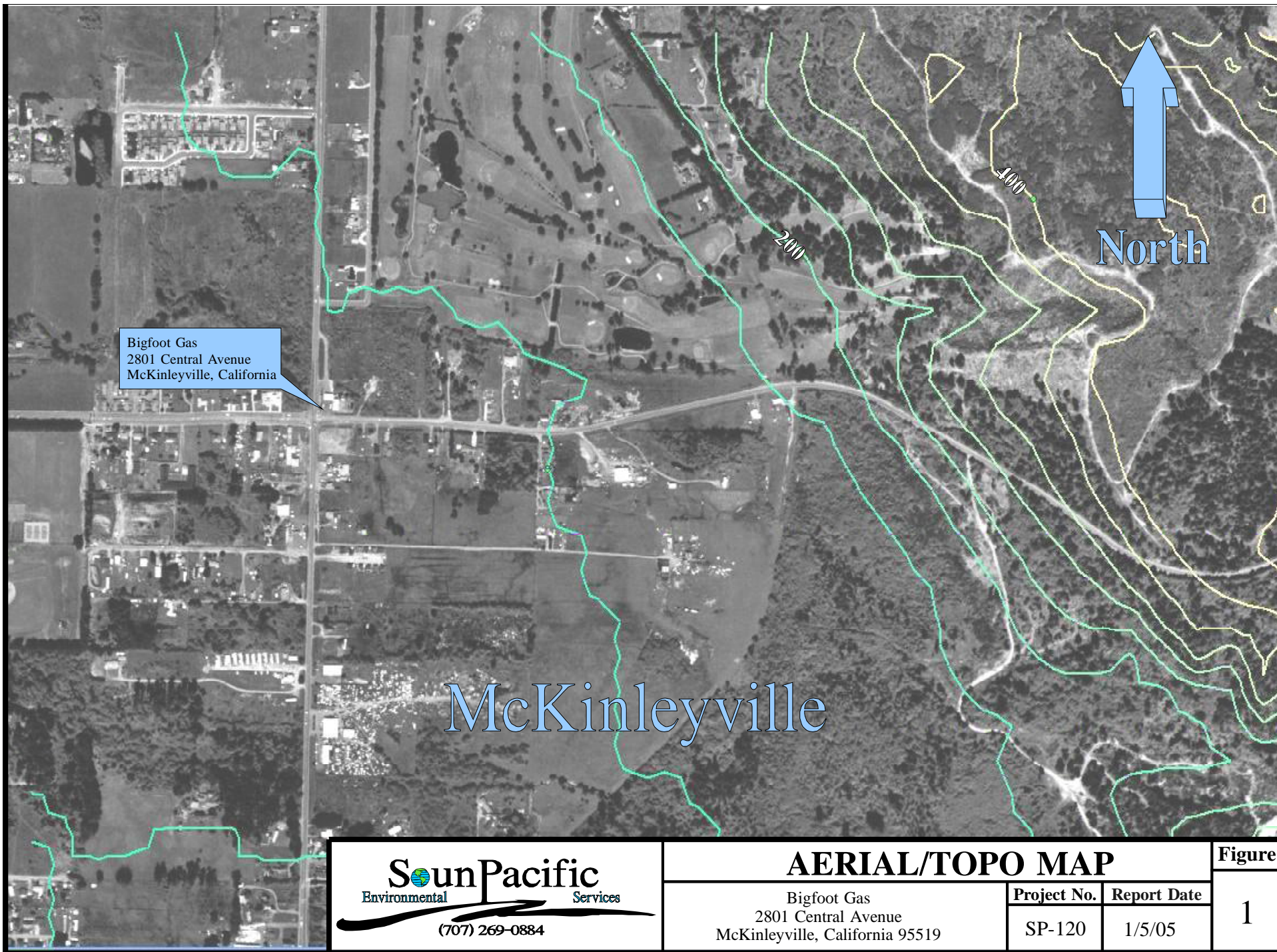
TPHg: Total petroleum hydrocarbons as gasoline
 MTBE: Methyl tertiary butyl ether
 DIPE: Diisopropyl ether
 TAME: Tertiary amyl methyl ether
 TPHd: Total petroleum hydrocarbons as diesel
 NT: Not tested.

TBA: Tertiary butanol
 ETBE: Ethyl tertiary butyl ether
 TPHmo: Total petroleum hydrocarbons as motor oil
 ppb: parts per billion = µg/l = .001 mg/l = 0.001 ppm.
 ND: Not detected. Sample was detected at or below the method detection limit as shown.

Chart 1
Hydrograph
Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519



Figures



	AERIAL/TOPO MAP		Figure
	Bigfoot Gas 2801 Central Avenue McKinleyville, California 95519	Project No.	
		SP-120	Report Date 1/5/05
			1

CENTRAL AVENUE

NORTH

PL

Propane AGT

MW-1

MW-2

MW-3

MW-4

MW-5

MW-6

OFFICE


Oil & Gas/ Water Separator

(2) 12,000-gallon
spit compartmented USTs

Culvert for Norton Creek

Concrete Slabs

LEGEND

MW-1  Monitoring Well

--- Product Line

--- Electric Line

--- Sewer Line

--- Water Line

 Cement Surface

0 30 60
APPROXIMATE SCALE IN FEET

MURRAY ROAD

SITE PLAN

Figure

2

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

SP-120

Report Date

2/5/05

Environmental

Services

CENTRAL AVENUE

GW Flow Direction: W
GW Gradient: 0.008 ft/ft

NORTH

Elevation Above
MSL

MW-1

Casing Elevation: 111.57
Depth to Water: 2.03
Elevation above MSL: 109.54

MW-2

Casing Elevation: 113.03
Depth to Water: 3.24
Elevation above MSL: 109.79

MW-3

Casing Elevation: 112.13
Depth to Water: 2.61
Elevation above MSL: 109.52

MW-6

Casing Elevation: 112.38
Depth to Water: 2.75
Elevation above MSL: 109.63

MW-4

Casing Elevation: 112.76
Depth to Water: 2.85
Elevation above MSL: 109.91

MW-5

Casing Elevation: 112.62
Depth to Water: 2.18
Elevation above MSL: 110.44

MURRAY ROAD

LEGEND



Monitoring Well

0 30 60

APPROXIMATE SCALE IN FEET

GROUNDWATER LEVEL CONTOUR MAP
MAY 2004

Figure

3

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

SP-120

Report Date

2/5/05

Environmental

Services

CENTRAL AVENUE

PL

NORTH

**Groundwater Results
MW-1**

MTBE 0.5 ppb

**Groundwater Results
MW-2**

TPHg 1,300 ppb
MTBE 1,200 ppb
TAME 530 ppb
TPHd 190 ppb

**Groundwater Results
MW-3**

TPHg 82 ppb
BTXE 0.5 ppb
MTBE 57 ppb
TAME 32 ppb
TPHd 55 ppb

**Groundwater Results
MW-5**

TPHg 54,000 ppb
BTXE 14,820 ppb
TPHd 19,000 ppb

**Groundwater Results
MW-4**

TPHg 8,000 ppb
BTXE 1,194 ppb
MTBE 19 ppb
TPHd 1,300 ppb

**Groundwater Results
MW-6**

TPHg 2,200 ppb
BTXE 231.9 ppb
MTBE 69 ppb
TAME 17 ppb
TBA 27 ppb
TPHd 590 ppb

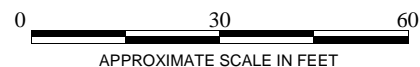
OFFICE

MURRAY ROAD

LEGEND



Monitoring Well



GROUNDWATER ANALYTICAL RESULTS

Figure

4



Services

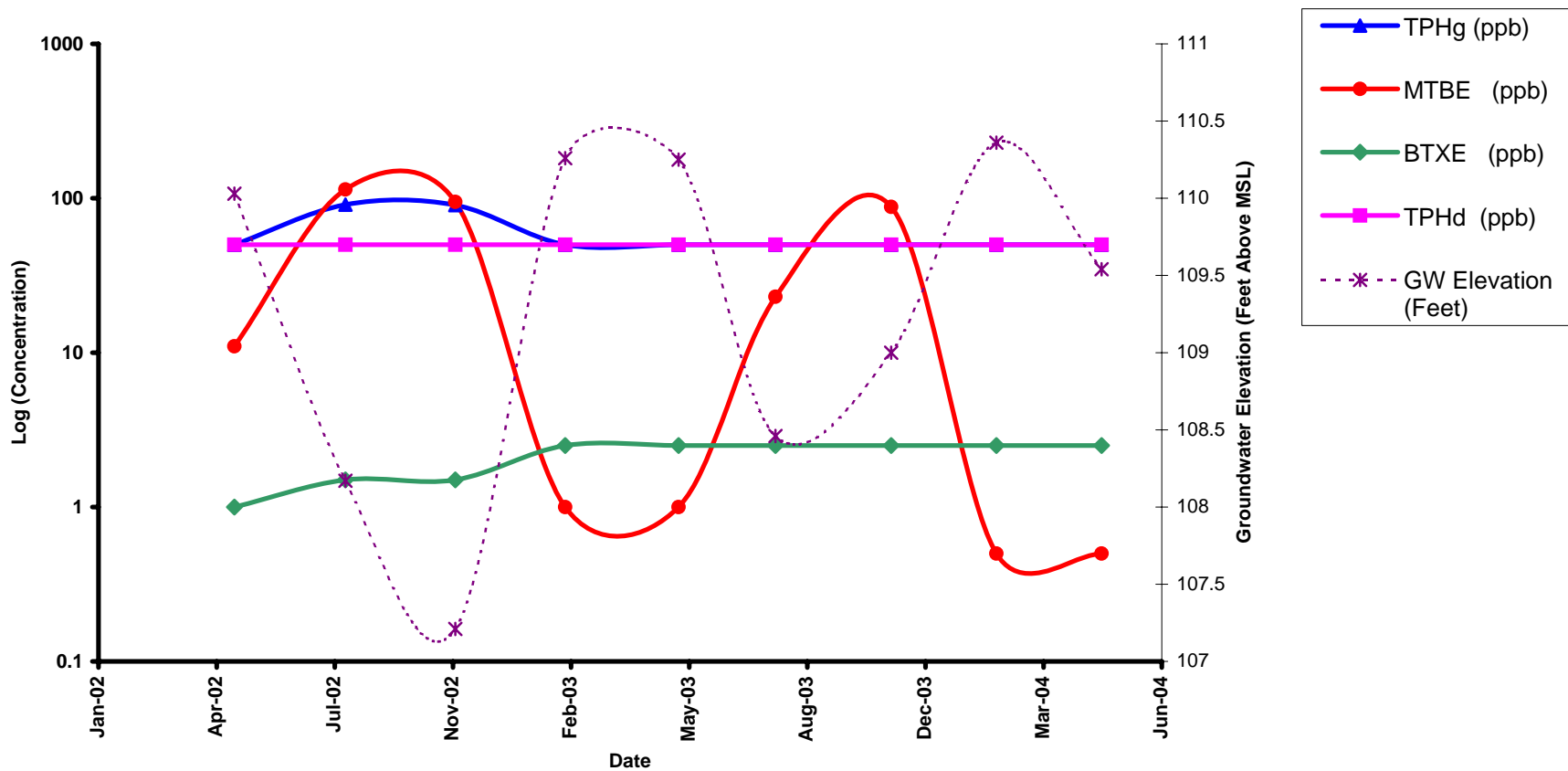
Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

SP-120

Report Date

2/5/05



SounPacific
 Environmental Services
 (707) 269-0884

MW-1 HYDROCARBON CONCENTRATIONS VS. TIME

Bigfoot Gas
 2801 Central Avenue
 McKinleyville, California 95519

Project No.

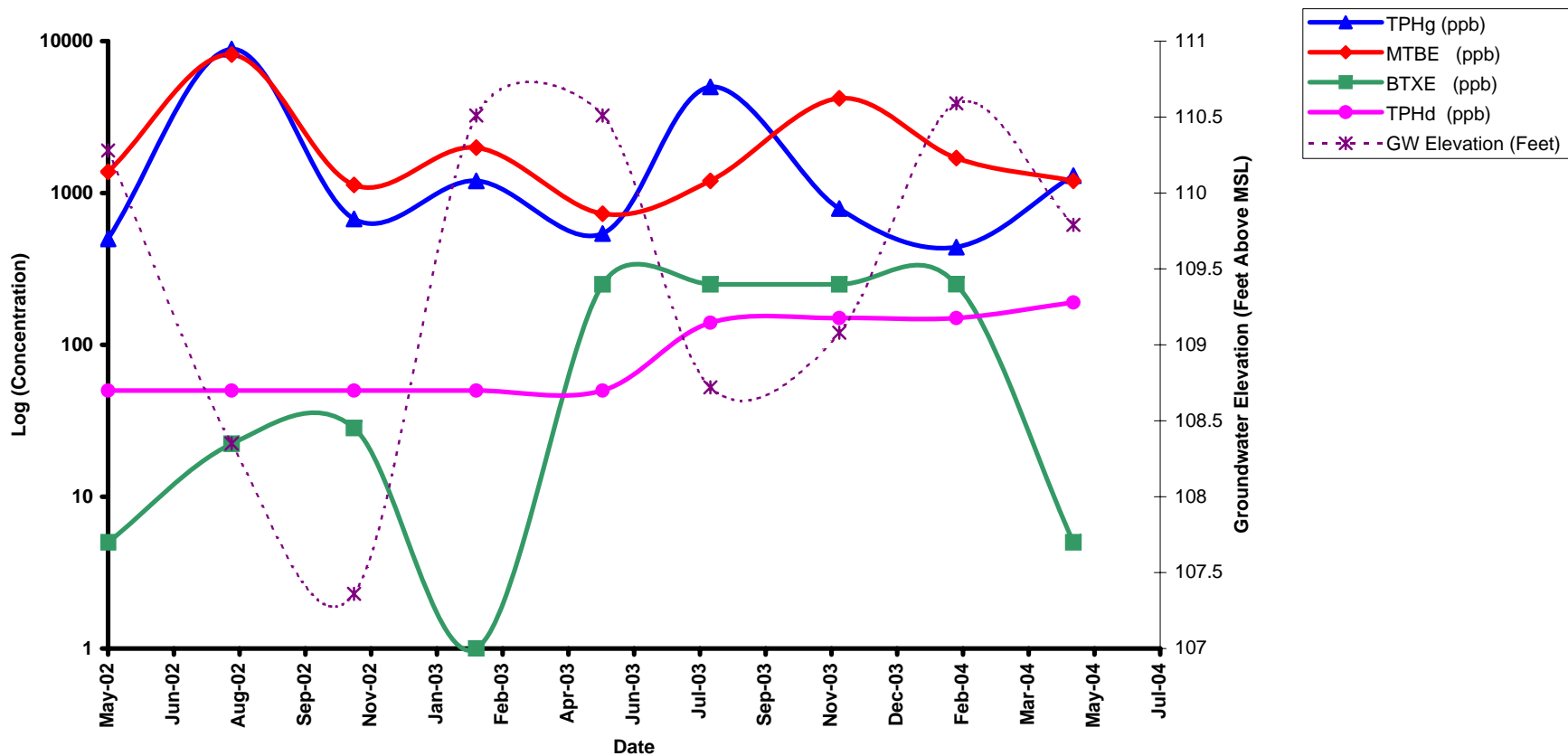
SP-120

Date

1/5/2005

Figure

5



Soun Pacific
 Environmental Services
 (707) 269-0884

MW-2 HYDROCARBON CONCENTRATIONS VS. TIME

Bigfoot Gas
 2801 Central Avenue
 McKinleyville, California 95519

Project No.

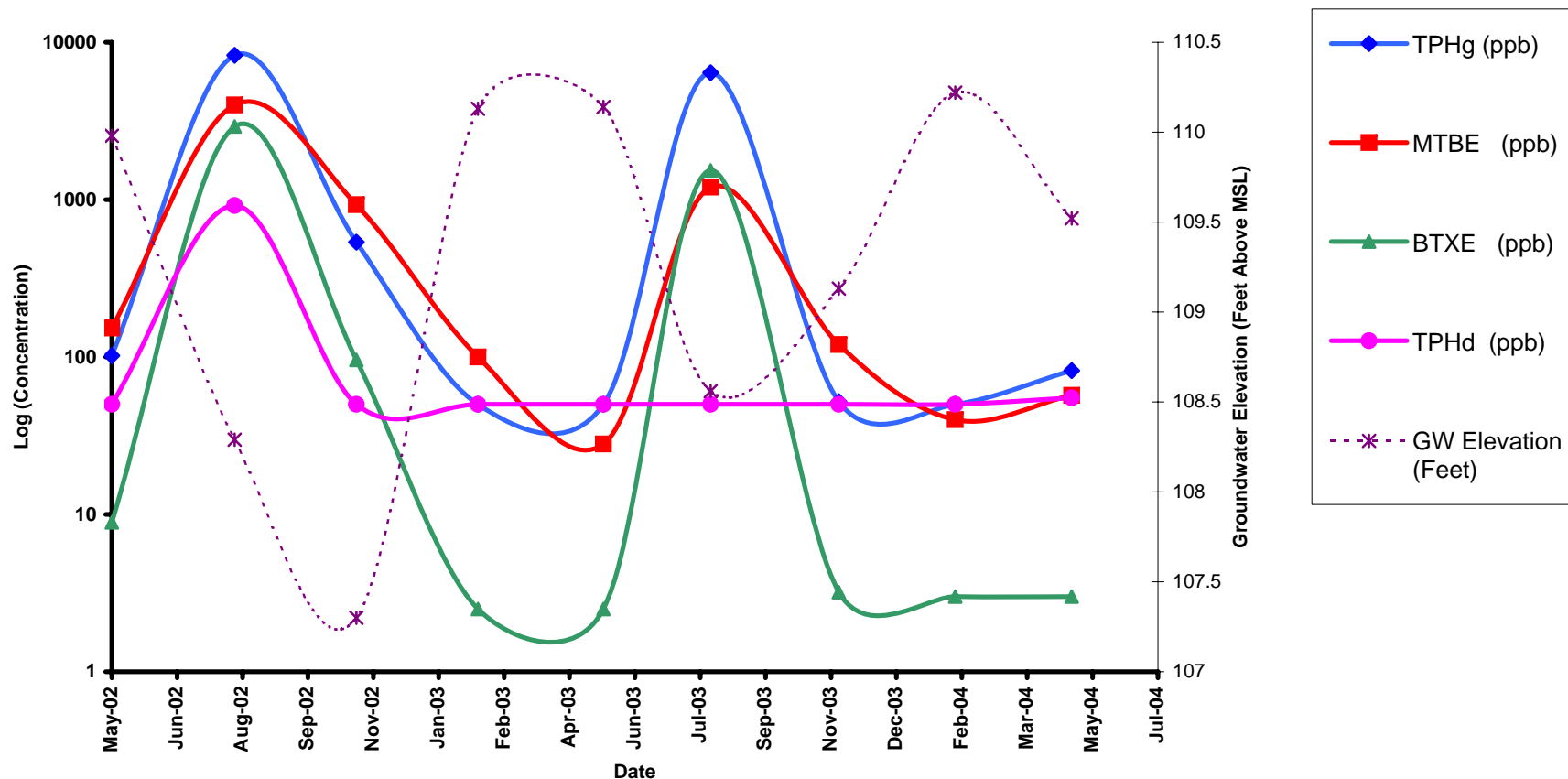
SP-120

Date

1/5/2005

Figure

6



SounPacific
Environmental Services
(707) 269-0884

MW-3 HYDROCARBON CONCENTRATIONS VS. TIME

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

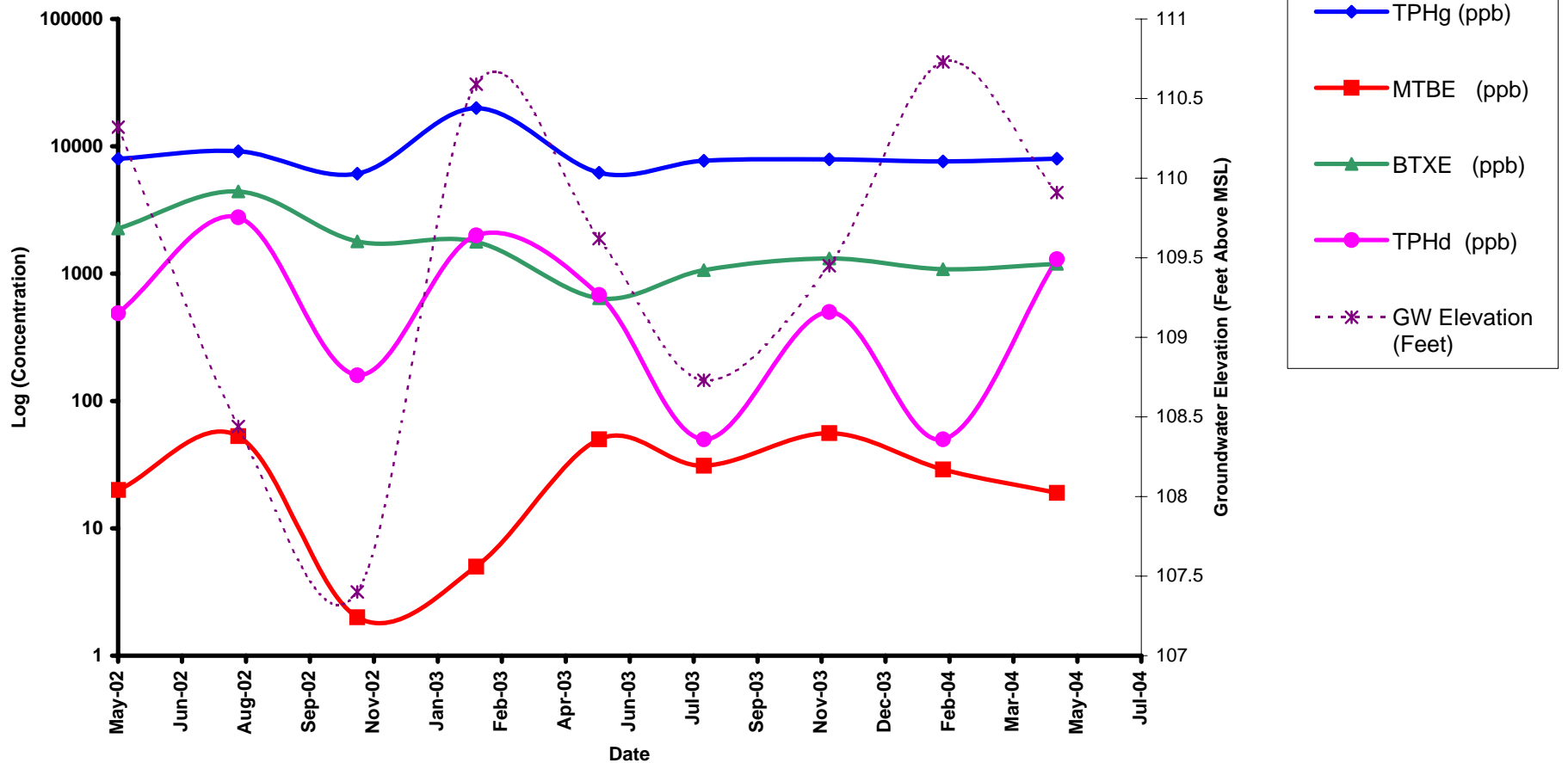
SP-120

Date

1/5/2005

Figure

7



MW-4 HYDROCARBON CONCENTRATIONS VS. TIME

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

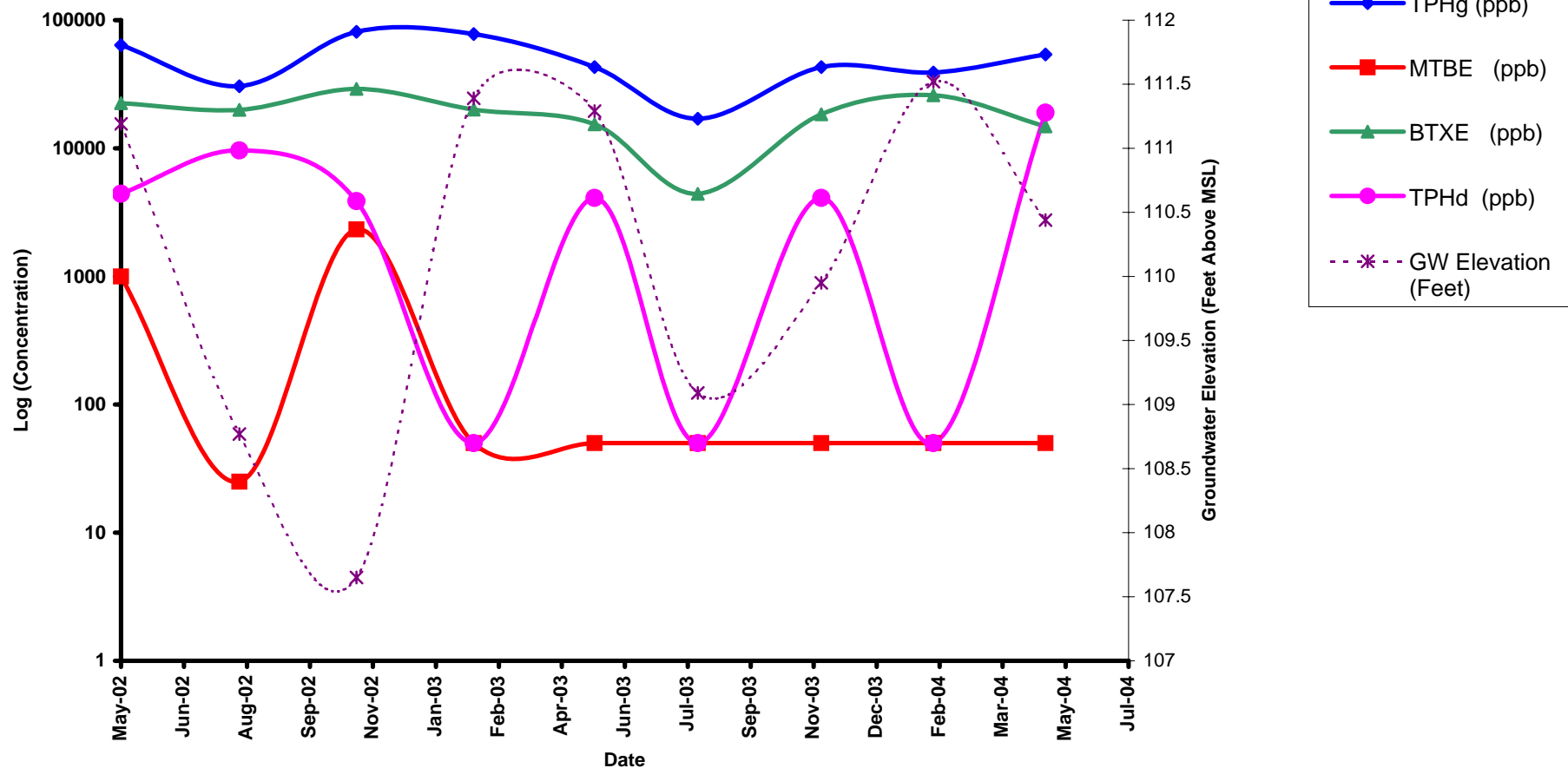
SP-120

Date

1/5/2005

Figure

8



MW-5 HYDROCARBON CONCENTRATIONS VS. TIME

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

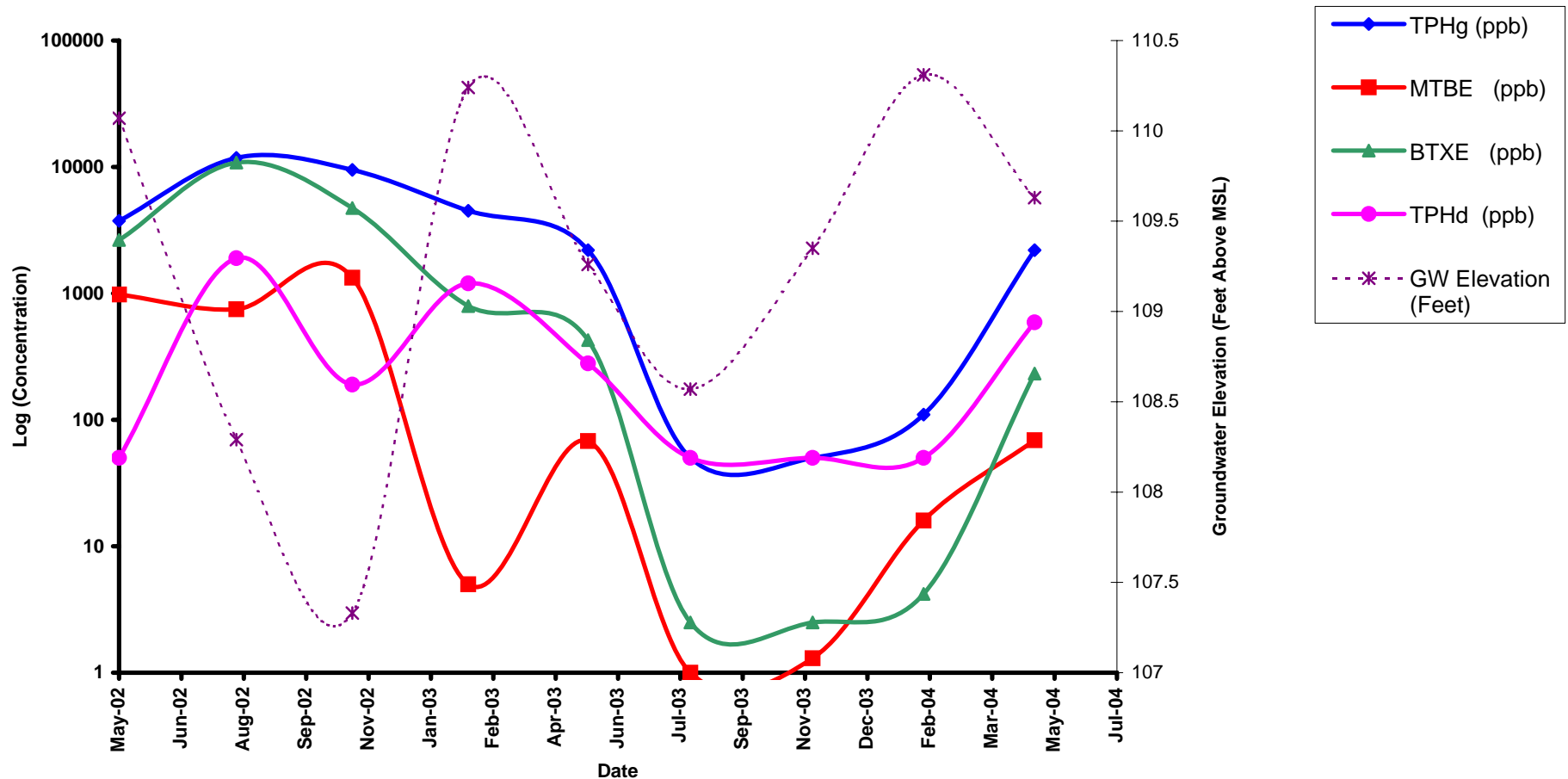
SP-120

Date

1/5/2005

Figure

9



MW-6 HYDROCARBON CONCENTRATIONS VS. TIME

Bigfoot Gas
2801 Central Avenue
McKinleyville, California 95519

Project No.

SP-120

Date

1/5/2005

Figure

10

Appendices

Appendix A

EXCELCHEM ENVIRONMENTAL LABS

300 Broadway Street
Eureka, CA 95501
Phone#: (707) 444-0120 Fax#: (707) 444-0560



ANALYSIS REPORT

Attention: Andy Malone
SounPacific Environmental Services
P.O. Box 13
Kneeland, CA 95549
Project: Bigfoot Gas / SP-120
Method: EPA 8260B

Date Received: 05/04/04
Date Analyzed: 05/07/04



RECEIVED
5-24-04

Client Sample I.D.	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
Date Sampled	05/04/04		05/04/04		05/04/04		05/04/04		05/04/04		05/04/04	
LAB. NO.	W0504113		W0504114		W0504115		W0504116		W0504117		W0504118	
ANALYTE	R/L	Results	R/L	Results	R/L	Results	R/L	Results	R/L	Results	R/L	Results
TPH as Gasoline	50	ND	500	1300	50	82	500	8000	5000	54000	50	2200
Benzene	0.5	ND	5.0	ND	0.5	ND	5.0	130	50	ND	0.5	25
Toluene	0.5	ND	5.0	ND	0.5	ND	5.0	140	50	720	0.5	2.4
Ethylbenzene	0.5	ND	5.0	ND	0.5	ND	5.0	420	50	1300	0.5	4.0
m,p-xylene	0.5	ND	5.0	ND	0.5	0.5	5.0	420	50	9600	0.5	200
o-xylene	0.5	ND	5.0	ND	0.5	ND	5.0	84	50	3200	0.5	0.5
tert-Butanol	5.0	ND	500	ND	5.0	ND	50	ND	500	ND	5.0	27
MTBE	0.5	0.5	50	1200	0.5	57	5.0	19	50	ND	0.5	69
Diisopropyl ether	0.5	ND	50	ND	0.5	ND	5.0	ND	50	ND	0.5	ND
Ethyl tert-butyl ether	0.5	ND	50	ND	0.5	ND	5.0	ND	50	ND	0.5	ND
tert-Amyl methyl ether	0.5	ND	50	530	0.5	32	5.0	ND	50	ND	0.5	17
1,2-Dichloroethane	0.5	ND	50	ND	0.5	0.8	5.0	ND	50	ND	0.5	ND
1,2-Dibromoethane	0.5	ND	50	ND	0.5	ND	5.0	ND	50	ND	0.5	ND
SURROGATE %RECOVERY												
Dibromoflouromethane	97		97		96		96		99		98	
Toluene-d8	101		100		100		101		101		102	
4-Bromofluorobenzene	100		99		100		99		99		102	

QA/QC %RECOVERY		
	LCS	LCSD
1,1-Dichloroethene	107	108
Benzene	102	102
Trichloroethene	102	101
Toluene	102	99
Chlorobenzene	104	101

QA/QC Analyzed: 05/07/04

ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.
R/L = Reporting Limit
Water samples reported in µg/L

Laboratory Representative

05/13/04
Date Reported

**EXCELCHEM
ENVIRONMENTAL LABS**

300 Broadway Street
Eureka, CA 95501

Phone#: (707) 444-0120 Fax#: (707) 444-0560



ANALYSIS REPORT

Attention: Andy Malone
SounPacific Environmental Services
P.O. Box 13
Kneeland, CA 95549
Project: Bigfoot Gas / SP-120
Method: EPA 8015m

Date Received: 05/04/04
Date Analyzed: 05/06/04

Client Sample I.D.	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
Date Sampled	05/04/04		05/04/04		05/04/04		05/04/04		05/04/04		05/04/04	
LAB. NO.	W0504113		W0504114		W0504115		W0504116		W0504117		W0504118	
ANALYTE	R/L	Results	R/L	Results	R/L	Results	R/L	Results	R/L	Results	R/L	Results
TPH as Diesel	50	ND	50	190	50	55	50	1300*	100	19000*	50	590
TPH as Oil	500	ND	500	ND	500	ND	500	ND	500	ND	500	ND

QA/QC %RECOVERY		
	LCS	LCSD
TPH as Diesel	99	82
TPH as Oil	72	86

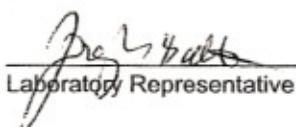
QA/QC Analyzed: 05/12/04

ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.

R/L = Reporting Limit

Water samples reported in µg/L

* The sample chromatogram does not match the standard diesel chromatogram.
All peaks were integrated within the diesel range. The result is an estimated value.


Laboratory Representative

05/13/04
Date Reported

504001

Excelchem Environmental Labs Project Manager: <i>Andy Malone</i> Company / Address: SounPacific Environmental Services P.O. Box 13 Kneeland, CA 95549 Project Name: <i>Bigfoot GAS</i> Sampling Event: <i>8th Quarterly</i>		300 Broadway Eureka, CA 95501 Ph: 707-444-0120 Fx: 707-444-0560 Phone #: 707-269-0884 Fax #: 707-269-0699 Project Number / P.O. #: <i>SP-120</i> Sampler Signature: <i>Andy Malone</i>		CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST Electronic Data Deliverables Request: Global I.D. #: <i>70602300275</i> COC #: Location I.D. # E-mail Address: sounpacific@starband.net <i>maloneinnovations@cox.net</i> ANALYSIS REQUEST Page <i>1</i> of <i>1</i> Bin # <i>A-37</i> <i>0506A</i> Due Date: <i>11-May-04</i>																														
Sample ID	Date / Time	VOA	SLEEVE	IL GLASS	PLASTIC	HCl	HNO ₃	ICE	Methanol	Bisulfate	None	WATER	SOIL	AIR	BTX (802 / 8020) or (8260) CIRCLE ONE	TPH as Gas (8015m) <i>8260</i>	TPH as Diesel (8015m)	TPH as Oil (8015m)	Total Oil & Grease (SM-18a Ed. 5520B.F) 1664	MTBE (8020) or (8260) CIRCLE ONE	Methanol (8015) / Ethanol (8260)	5 Oxygenates (8260)	Lead Scavengers (DCA / EDI) (8260B)	Closed System Purge & Trap (5030 / 5035)	VOC Full List (8260B)	Semi-VOC Full List (8270C)	CAM 17 Metals	Lead	CAM 5 (Cd, Cr, Pb, Zn, Ni)	PCBs (8082)	Pesticides (608 / 8081A)	Request TAT: 12 hr / 24 hr / 48 hr / 72 hr / 1 wk	LAB USE ONLY:	
MW-1	5.4.04	2	2			X	X					X			X	X	X	X																W0504113
MW-2																																		W0504114
MW-3																																		W0504115
MW-4																																		W0504116
MW-5																																		W0504117
MW-6																																		W0504118
Relinquished by:		Date	Time	Received by:		Remarks / Condition of Sample:																												
<i>Andy Malone</i>		5.4.04	3:15	<i>Robert King</i>		(Please e-mail COELT and results to e-mail address(es), no faxes.)																												
Relinquished by:		Date	Time	Received by:																														
Relinquished by:		Date	Time	Received by Laboratory:		Bill To:																												
		5/6	10:15	<i>Mia</i>		SounPacific																												

Appendix B



Standard Operating Procedures

Groundwater Level Measurements and Free Phase Hydrocarbon Measurements

All SounPacific staff and contractors shall adopt the following procedures any time that groundwater elevations are determined for the purposes of establishing groundwater gradient and direction, and prior to any sampling event.

Wells are to be tested for free phase hydrocarbons (free product) before the first development or sampling of any new well, and in any well that has historically contained free product.

Equipment Checklist

- ☐ Combination water level / free phase hydrocarbon indicator probe (probe)
- ☐ Gauging Data / Purge Calculations Sheet
- ☐ Pencil or Pen/sharpie
- ☐ Disposable Gloves
- ☐ Distilled Water and or know water source on site that is clean
- ☐ Alconox (powder) or Liquinox (liquid) non-phosphate cleaners—do not use soap!
- ☐ Buckets or Tubs for decontamination station
- ☐ Tools necessary to access wells
- ☐ Site Safety Plan
- ☐ This Standard Operating Procedure
- ☐ Notify Job site business that you will be arriving to conduct work.

Procedure

1. Review Site Safety Plan and utilize personal protection appropriate for the contaminants that may be encountered.
2. Access and open all monitoring wells to be measured. Allow wells to equilibrate for approximately 15 minutes before taking any measurements.

3. Decontaminate probe with Alconox or Liquinox solution, and rinse with distilled water.
4. Determine the diameter of the well to be measured and indicate this on the Gauging Data / Purge Calculations Sheet.
5. Words of caution: Please be careful with water level and product meters probes are not attached with high strength material so please make sure to avoid catching the end on anything in the well and make sure not to wind reel to the point that it could pull on the probe. ***If product is suspect in a well, go to step 6, if no product is suspected go to step 7 below.***
6. **When product is present or suspected:** use the product level meter. Clip the static charge clamp to the side of the well casing. Then lower probe into the well through the product/water interface about one foot if possible. Then slowly raise the probe back up through the product/water interface layer and record the level as the tone changes from solid to broken-record this level in the Gauging Data / Purge Calculations Sheet to the nearest 0.01 foot (DTP). Continue to raise the probe up through the product until the tone stops completely-record this level on the Gauging Data / Purge Calculations Sheet to the nearest 0.01 foot (DTW). Then go to step 8.
7. **When no product is present or suspected:** If no free product is present, record the depth of the water (to the nearest 0.01 foot) relative to the painted black mark on the top of the well casing. Leave the probe in the well just a hair above the water level to ensure the well as equilibrated. As the well rises, the tone will sound. Make sure no increase in water levels have occurred in over a ten-minute period. Water levels can lower as well as rise. Make sure you note when the level you keep lowering the probe to has remained stable for at least ten minutes. Once this has been accomplished, please record this level in the Gauging Data / Purge Calculations Sheet to the nearest 0.01 foot (DTW).
8. Turn off the probe, and use the probe to determine the depth to the bottom of the well relative to the top of the well casing. This is the depth to bottom measurement (DTB).
9. Decontaminate probe and tape by washing in an Alconox/Liquinox solution (***read directions on solution for ratio of water to cleanser***) and use the toothbrush provided to remove any foreign substance from the probe and tape. Then triple rinse probe and tape with clean water and then proceed to take measurements in the next well.
10. If sampling is to occur, proceed to implement SounPacific's Standard Operating Procedure for Monitoring Well Purging and Sampling. If no sampling is to be performed, close and secure all wells and caps.



Standard Operating Procedures

Monitoring Well Purging and Groundwater Sampling

All SounPacific employees and contractors shall adopt the following procedures any time that groundwater samples are to be taken from an existing groundwater monitoring well.

Prior to the implementation of these procedures, the groundwater level **MUST** be measured and the presence of free phase hydrocarbons determined in accordance with SounPacific's Standard Operating Procedures for Groundwater Level Measurements and Free Phase Hydrocarbon Measurements.

Equipment Checklist

- ☐ **Gauging Data / Purge Calculations Sheet used for water level determination**
- ☐ Chain of Custody Form
- ☐ pH/ Conductivity / Temperature meter
- ☐ Pencil or Pen
- ☐ Indelible Marker
- ☐ Calculator
- ☐ Disposable Gloves
- ☐ Distilled Water
- ☐ Alconox/liquinox liquid or powdered non-phosphate cleaner
- ☐ Buckets or Tubs for decontamination station
- ☐ Bottom-filling bailer or pumping device for purging
- ☐ Disposable bottom-filling bailer and emptying device for sampling
- ☐ String, twine or fishing line for bailers
- ☐ Sample containers appropriate for intended analytical method (check with lab)
- ☐ Sample labels
- ☐ Site Safety Plan
- ☐ Tools necessary to access wells
- ☐ Drum space on site adequate for sampling event

Procedure

1. Review Site Safety Plan and utilize personal protection appropriate for the contaminants that may be encountered.
2. Measure groundwater levels and check for the presence of free product in accordance with the Standard Operating Procedures for Groundwater Level Measurements and Free Phase Hydrocarbon Measurements.

Purging

3. Calculate and record the volume of standing water in each well using the information provided on the Gauging Data / Purge Calculations sheet.
 $(DTB-DTW) \times \text{Conversion Factor} = \text{Casing Volume}$.
4. The purge volume shall be at least three times and no more than seven times the volume of standing water (the casing volume).
5. Purge the well by bailing or pumping water from the well into a calibrated receptacle, such as a five gallon bucket or tub with markings to indicate one gallon increments. Collect purgeate in a 55 gallon labeled drum and store on site. Drum labels should include the date, contents, site number, and SounPacific's name and telephone number.
6. Take measurements of pH, conductivity, temperature, and visual observations to verify the stabilization of these parameters. At least five measurements of these parameters should be made throughout the purging process. The parameters shall be considered stabilized if successive measurements vary by less than 0.25 pH units, 10% of conductivity in μS , and 1°C (or 1.8°F). Continue purging until at least three times the casing volume has been removed, and the measured parameters have stabilized as indicated above. Do not exceed seven casing volumes.
7. Take a final depth to groundwater measurement and calculate the casing volume of the recharged well. Ideally, the casing volume should have recharged to at least 80% of the original measured casing volume before sampling commences. If due to slow recharge rates it is not feasible to wait for the well to fully recharge, then note this on the Gauging Data / Purge Calculation Sheet and proceed to sample following the procedure below.

Sampling

8. **After completing groundwater measurement, and checking for free product if necessary, in accordance with SounPacific's Standard Operating Procedures for Groundwater Level Measurements and Free Phase Hydrocarbon Measurements, and after purging monitoring wells as described above, groundwater samples may be collected.**
9. Slowly lower a clean, previously unused disposable bailer into the well water approximately half of the bailer length, and allow the bailer to slowly fill.
10. Withdraw the full bailer from the monitoring well and utilize the included (clean and unused) bottom-emptying device to fill the necessary sample containers, and seal the container with the included PTFE (Teflon) lined cap.
11. When filling VOAs, fill the VOA completely full, with the meniscus rising above the rim of the bottle. Carefully cap the VOA and invert it and gently tap it to determine whether air bubbles are trapped inside. If the VOA contains air bubbles, refill the VOA and repeat this step.
12. All samples shall be labeled with the Sample ID, the Sample Date, and the Sample Location or Project Number. Use an indelible marker for writing on sample labels.
13. Record all pertinent sample data on the Chain of Custody.
14. Place samples in an ice chest cooled to 4°C with ice or "blue ice". Bottles should be wrapped in bubble wrap, and VOA's should be inserted in a foam VOA holder to protect against breakage. Samples are to be kept at 4°C until delivered to the laboratory. Any transference of sample custody shall be indicated on the Chain of Custody with the appropriate signatures as necessary.
15. Utilize clean, previously unused gloves, bailer and line, and bottom-emptying device for each well sampled.
16. When finished with all sampling, close and secure all monitoring wells.
17. Leave the site cleaner than when you arrived and drive safely.

Appendix C

GAUGING DATA/PURGE CALCULATIONS

Job Site: BIGFOOT GASJob No.: SP-120Event: 8th QuarterlyDate: 5.4.04

SounPacific
Environmental Services

(707) 269-0884

DTWAO (ft.)	WELL ID	DIA. (in.)	DTB (ft.)	DTW (ft.)	ST (ft.)	CV (gal.)	PV (gal.)	SPL (ft.)	Bailer Loads	Notes
2.45	MW-1	2	11.88	2.03	9.85	1.6	4.8	0	19	sheen detected
4.02	MW-2		11.98	3.24	8.74	1.4	4.2	1	17	no sheen detected
2.41	MW-3		11.46	2.61	8.85	1.4	4.2		17	sheen detected
2.85	MW-4		11.32	2.85	8.47	1.4	4.2		17	no sheen detected
2.16	MW-5		11.36	2.18	9.18	1.5	4.5		18	sheen detected
2.76	MW-6	✓	11.13	2.75	8.38	1.3	3.9	✓	16	sheen detected

Explanation:

DIA. = Well Diameter

DTB = Depth to Bottom

DTW = Depth to Water

ST = Saturated Thickness (DTB-DTW)

CV = Casing Volume (ST x cf)

PV = Purge Volume (standard 3 x CV,
well development 10 x CV)

SPL = Thickness of Separate Phase Liquid

Conversion Factors (cf):

2 in. dia. well cf = 0.16 gal./ft.

4 in. dia. well cf = 0.65 gal./ft.

6 in. dia. well cf = 1.41 gal./ft.

— after recharge

Sampler:

D. Malone

DTWAO = Depth to water at time of well opening

FILE

PURGING DATA

SHEET

1 of 2

Job No.: SP-120 Location: Bigfoot Gas Date: 5.4.09 Tech: D. Malone

Soun Pacific
Environmental Services

(707) 269-0884

WELL No.	TIME (min)	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	Sample at:
MW-1	0	0	—	—	—	Sample for: (Circle analytes)
Calc. purge volume	16.4 %	0.195	56.43	6.74	TPH _g	TPH _d 8260
	16.0 %	0.196	56.56	6.75	BTEX	MTBE Metals
	15.7 %	0.193	56.61	6.72		
Purging Method:						PVC hailer Pump
COMMENTS: color, turbidity, recharge, screen						Sampling Method:
						Dedicated / Disposable Hailer

WELL No.	TIME (min)	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	Sample at:
MW-2	0	0	—	—	—	Sample for:
Calc. purge volume	1.7 %	0.721	55.76	6.77	TPH _g	TPH _d 8260
	1.4 %	0.721	55.85	6.77	BTEX	MTBE Metals
	1.5 %	0.720	55.86	6.77		
Purging Method:						PVC hailer Pump
COMMENTS: color, turbidity, recharge, screen						Sampling Method:
						Dedicated / Disposable Hailer

WELL No.	TIME (min)	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	Sample at:
MW-3	0	0	—	—	—	Sample for:
Calc. purge volume	2.1 %	0.180	58.19	6.82	TPH _g	TPH _d 8260
	2.7 %	0.184	58.22	6.76	BTEX	MTBE Metals
	2.9 %	0.185	58.21	6.73		
Purging Method:						PVC hailer Pump
COMMENTS: color, turbidity, recharge, screen						Sampling Method:
						Dedicated / Disposable Hailer

PURGING DATA

SUBJECT

2 2

Job No.:

SP-120

Location:

Bigfoot Gas

Date:

5.4.04

Techn:

D. Malone

Soun Pacific
Environmental Services

(707) 269-0884

WELL No.	TIME % DO	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	Sample at:
MW-4		0	—	—	—	Sample for: (Circle analytes)
Calc. purge	1.6 %		0.375	63.76	6.75	TPHe TPId 8260
volume	1.5 %		0.375	63.72	6.76	BTEX MTBE Metals
	1.8 %		0.380	63.80	6.76	Purging Method:
						PVC bailer / Pump
COMMENTS: color, turbidity, recharge, shown						Sampling Method:
						Dedicated / Disposable bailer

WELL No.	TIME % DO	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	Sample at:
MW-5		0	—	—	—	Sample for:
Calc. purge	3.9 %		0.276	60.41	6.70	TPHe TPId 8260
volume	3.8 %		0.276	60.38	6.69	BTEX MTBE Metals
	3.7 %		0.276	60.30	6.68	Purging Method:
						PVC bailer / Pump
COMMENTS: color, turbidity, recharge, shown						Sampling Method:
						Dedicated / Disposable bailer

WELL No.	TIME % DO	VOLUME (gal.)	COND. (mS/cm)	TEMP. (deg. F.)	pH	Sample at:
MW-6		0	—	—	—	Sample for:
Calc. purge	1.6 %		0.247	58.06	6.60	TPHe TPId 8260
volume	1.3 %		0.247	58.06	6.56	BTEX MTBE Metals
	1.3 %		0.249	58.00	6.55	Purging Method:
						PVC bailer / Pump
COMMENTS: color, turbidity, recharge, shown						Sampling Method:
						Dedicated / Disposable bailer